Analysis of System Needs and Capacity

Using the Transfer System Level of Service Evaluation Criteria and Standards

March 2005

Prepared by:

King County Solid Waste Division
in collaboration with the
Interjurisdictional Technical Staff Group
Metropolitan Solid Waste Management Advisory Committee
Solid Waste Advisory Committee
and
King County Council Staff

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Solid Waste Division

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Executive Summary

This report is the second in a series of reports to evaluate the existing regional solid waste system and prepare for the future of solid waste transfer and disposal, including the transition to waste export. The report was prepared by the Solid Waste Division in collaboration with the Interjurisdictional Technical Staff Group (ITSG), the Metropolitan Solid Waste Management Advisory Committee (MSWMAC) and the Solid Waste Advisory Committee (SWAC). This effort is undertaken in accordance with King County Ordinance 14971 (Appendix A).

Generally, the application of the criteria resulted in a yes/no finding, i.e. the station does or does not meet the criteria. Although this report concludes that the stations do not meet many of the criteria, the facilities do meet all local and state health and safety requirements.

Ordinance 14971 established the process and timeline for developing a waste export system plan. It created MSWMAC and formalized the working relationship of the division, cities and county council staff (ITSG). The ordinance also required that four milestone reports be submitted to the King County Council and the Solid Waste Interlocal Forum prior to completion of the waste export system plan. The four milestone reports are:

1. Transfer System Level of Service Evaluation Criteria and Standards
2. Analysis of Transfer System Needs and Capacity
3. Public/Private Options for Ownership/Operation of Transfer and Intermodal Facilities
4. Preliminary Transfer and Waste Export Facility Recommendations

The first milestone report – Transfer System Level of Service Evaluation Criteria and Standards – was adopted by the King County Council on December 6, 2004. The report established evaluation criteria and standards by which the Solid Waste Division's existing transfer facilities would be assessed.

This report - The Analysis of Transfer System Needs and Capacity - presents the results of applying the transfer station criteria to each of the stations being evaluated. It does not contain alternatives and recommendations for the transfer system, which will be included in the fourth milestone report.

While nineteen evaluation criteria were developed, this report addresses criteria one through sixteen. Criterion 17 – Other Local and Regional Considerations – will be added at a later date as an addendum to this report after MSWMAC has had the opportunity for in-depth discussion of this criterion.

Criteria 18 and 19 address cost and rate considerations and will be part of the development of system alternatives, which will be contained in the fourth milestone report.

Three of the county's eight urban transfer stations were not evaluated for this report. The First Northeast Transfer Station in Shoreline is not included because it is scheduled to be rebuilt in 2005. The Vashon and Enumclaw transfer stations were also excluded from the evaluation because they are relatively new stations, constructed in 1999 and 1993, respectively. Theses three stations were, or will be, built to meet all the standards established for evaluation the older transfer stations.

As stated in the first report on the Transfer System Level of Service Evaluation Criteria and Standards, evaluation of the transfer system is an iterative process. Refinements to each report will be made based on input and ongoing data collection and analysis.

Criteria 1 – 16 are organized into four general categories. At this time the criteria have not been ranked; however, both SWAC and MSWMAC are interested in ranking the criteria at a later date.

1. Level of Service to Users – Criteria 1 through 4
2. Station Capacity and Characteristics for Solid waste and Recycling – Criteria 5 through 12
3. Local and Regional Effects of Facility – Criteria 13 through 17
4. Cost and Rate Impacts – Criteria 18 and 19

Two more milestone reports will be submitted to the Council in preparation for the Solid Waste Export System Plan:

- Analysis of Options for Public and Private Ownership and Operation
- Preliminary Transfer and Waste Export Facility Recommendations (with estimated system costs, rate impacts, and financial policy assumptions)

As required by Ordinance 14971, each report shall include the due date for submittal of the subsequent report and be approved by the Council by motion.

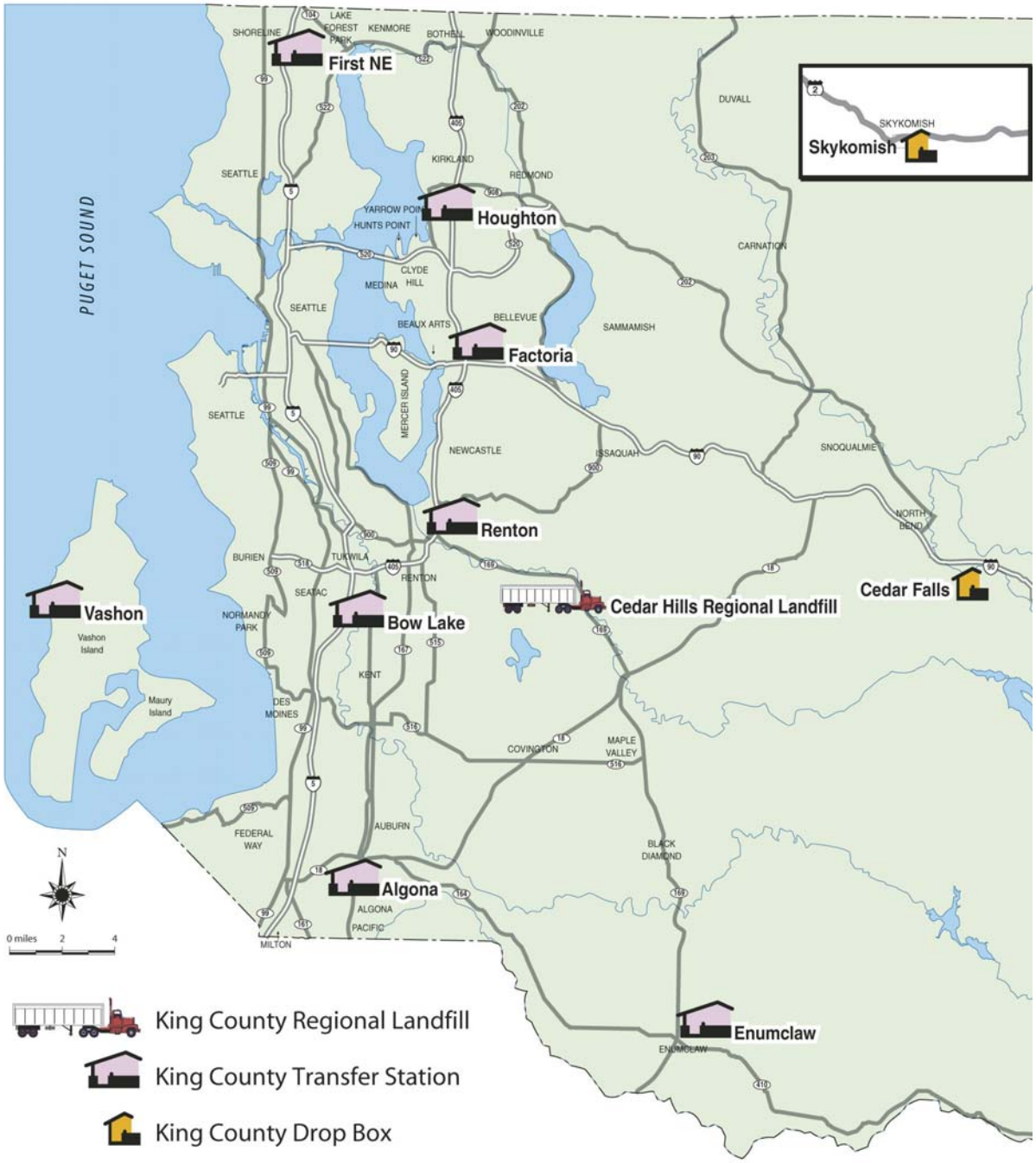
Introduction

The Solid Waste Division operates eight solid waste transfer stations and two rural drop boxes across King County (see Figure 1). These facilities serve 37 of the 39 cities in King County and the unincorporated areas. Seattle and Milton are not part of the King County solid waste system. The facilities are situated throughout the county to provide service in the major urban and rural areas for both commercial collection trucks, and residential and business self haulers. The transfer system has both older and newer transfer stations. Six of the eight stations – the Algona, Bow Lake, Factoria, First Northeast, Houghton, and Renton transfer stations – were originally built between 1958 and the mid-1960s (although certain upgrades have been made since that time).

Three transfer stations are not evaluated for this report. The First Northeast Transfer Station in Shoreline is not included because it is scheduled to be rebuilt in 2005. The Vashon and Enumclaw transfer stations also are excluded from evaluation because they are relatively new stations, constructed in 1999 and 1993, respectively. These three stations were, or will be, built to meet all the standards established for evaluating the older transfer stations. For example, all three stations are or will be equipped with waste compactors (Criterion 11).

Although the remaining five older stations are the focus of evaluation in this report, evaluations of the First Northeast, Vashon and Enumclaw stations may be conducted as part of the discussion of waste export system alternatives.

Figure 1: Transfer Stations in King County



The table below summarizes the application of Criteria 1-16 to the five urban transfer stations being evaluated. Following the table is a detailed description of each evaluation criterion and standard, including what it is intended to measure, how it was applied and what limitations, if any, are associated with the data.

Table 1: Summary Results of Applying Criteria

		Algona	Bow Lake	Factoria	Houghton	Renton
1. Estimated time to a transfer facility within the service area for 90% of users.	**< 30 min=yes**	**YES**	**YES**	**YES**	**YES**	**YES**
2. Time on site meets standard for 90% of trips						
a. commercial vehicles	**< 16 min=yes**	**NO**	**YES**	**NO**	**NO**	**NO**
b. business self haulers	**< 30 min=yes**	**YES**	**NO***	**NO***	**NO***	**YES**
c. residential self haulers	**< 30 min=yes**	**YES**	**NO***	**YES**	**YES**	**YES**
3. Facility hours meet user demand	**YES/NO**	**YES**	**YES**	**YES**	**YES**	**YES**
4. Recycling services … meet policies in SW Comp Plan						
a. business self haulers	**YES/NO**	**NO**	**NO**	**NO**	**NO**	**NO**
b. residential self haulers	**YES/NO**	**NO**	**NO**	**NO**	**NO**	**NO**
5. Vehicle capacity						
a. meets current needs	**YES/NO**	**NO**	**YES**	**NO**	**NO**	**YES**
b. meets 20 year forecast needs	**YES/NO**	**NO**	**NO**	**NO**	**NO**	**NO**
6. Average daily handling capacity (tons)						
a. meets current needs	**YES/NO**	**NO**	**NO**	**YES**	**NO**	**YES**
b. meets 20 year forecast needs	**YES/NO**	**NO**	**NO**	**NO**	**NO**	**YES**
7. Space for 3 days' storage						
a. meets current needs	**YES/NO**	**NO**	**NO**	**NO**	**NO**	**NO**
b. meets 20 year forecast needs	**YES/NO**	**NO**	**NO**	**NO**	**NO**	**NO**
8. Space exists for station expansion						
a. inside the property line	**YES/NO**	**NO**	**YES**	**YES**	**YES**	**YES**
b. on available adjacent lands through expansion	**YES/NO**	**YES**	**YES**	**YES**	**NO**	**NO**
9. Minimum roof clearance of 25 feet	**YES/NO**	**YES**	**YES**	**NO**	**NO**	**YES**
10. Meets facility safety goals	**YES/NO**	**NO***	**NO***	**NO***	**NO***	**NO***

Meets criterion weekdays, but not weekend days

**** The presence of these physical challenges does not mean that the stations operate in an unsafe manner. It does mean that it takes extra effort by staff and management, which reduces system efficiency, to ensure the facilities are operated safely.***

		Algona	Bow Lake	Factoria	Houghton	Renton
11. Ability to compact waste	**YES/NO**	**NO**	**NO**	**NO**	**NO**	**NO**
12. a. Meets goals for structural integrity	**YES/NO**	**YES**	**YES**	**YES**	**YES**	**YES**
b. Meets FEMA immediate occupancy standards	**YES/NO**	**YES**	**NO**	**NO**	**NO**	**YES**
13. Meets applicable local noise ordinance levels	**YES/NO**	**YES**	**YES**	**YES**	**YES**	**YES**
14. Meets PSCAA standards for odors	**YES/NO**	**YES**	**YES**	**YES**	**NO***	**YES**
15. Meets goals for traffic on local streets						
a. Meets LOS standard	**YES/NO**	**YES**	**NO**	**YES**	**YES**	**YES**
b. Traffic does not extend onto local streets 95% of time	**YES/NO**	**NO***	**NO***	**NO***	**YES**	**YES**
16. 100 foot buffer between active area & nearest residence	**YES/NO**	**YES**	**YES**	**YES***	**NO**	**YES**

One complaint on Houghton was verified within the previous 2 years. No citation was issued.

Meets criterion weekdays, but not weekend days. Yes or No rating based on evaluating all days w/in study period.

Meets 100 ft from residence criterion, but business within 100 ft.

Description and Application of Evaluation Criteria and Standards

The process for evaluating existing transfer stations is unique. While there are well-established processes for determining whether, or how, to site a new transfer station, there are not established processes for evaluating existing stations. The stations being evaluated have been in operation for more than 40 years. Therefore, the standards and criteria identified in this report are simply a means of synthesizing data related to certain aspects of transfer station operation.

The division's existing facilities have been upgraded over time to meet health, safety, and environmental codes.

The 16 evaluation criteria and standards summarized in Table 1 are evaluation tools developed by the ITSG to support the analyses required by King County Ordinance 14971, which are designed to establish –

> … when a transfer station needs to be upgraded in place, relocated to a more appropriate location, or additional transfer stations need to be built to adequately serve the region's growing population.

During iterative assessments, the group refined the evaluation criteria and standards and the way in which they would be applied to each station. A brief

description of each criterion and the associated standard is provided below, followed by a more detailed discussion of their application to the five transfer stations – Algona, Bow Lake (Tukwila/SeaTac), Factoria (Bellevue), Houghton (Kirkland), and Renton.

1. Estimated Travel Time to a Transfer Facility

Description: Travel time to a facility provides an indicator of how well dispersed the transfer stations are, given the population distribution and service needs of county residents and businesses. Estimated travel time for 90% of the traffic should be 30 minutes or less.

To measure the estimated travel time to a transfer station, the area served by each station was mapped based on transaction data from the stations and information gathered during waste characterization surveys. These data include both commercial collection companies and residential and business self haulers. The next step was to establish the farthest distance and most likely route within that area to the nearest transfer station. Once the routes and distances were determined, Mapquest® was used to estimate the travel time to each station. Mapquest uses the most current posted speed limits to estimate travel time between points, which does not take into account traffic patterns or other road conditions. This type of measurement is an accepted methodology for arriving at travel times.

Application: Estimated travel times and distances from the edge of the service area to the transfer station are shown in **Figure 2**. All transfer stations meet this standard for 90% of all transactions within the service area. Standards are met for 99% of all transactions within the contiguous urban growth boundary.[1]

[1] The Solid Waste Division's 2001 Comprehensive Solid Waste Management Plan recognizes that rural areas may receive reduced levels of service compared to urban areas.

Figure 2: Estimated Travel Times

2. Time On Site Meets the Standard for 90 Percent of Total Trips

Description: Time on site is one indicator of whether a transfer station can efficiently handle customers in a timely manner. It is determined by measuring the time from when a customer crosses the in-bound scale to when a customer crosses the outbound scale. It is an indicator of whether the facility is over-capacity. The standard is different for commercial collection companies and self haulers because of the difference in the way the two types of customers use the site. The goal is to meet the specified standard for 90 percent of the total transactions at a station.

The standard time on site for commercial collection companies is 16 minutes. This standard was proposed by one of the commercial collection companies as a viable amount of time to complete their business. For residential and business self haulers, the standard is 30 minutes. The division's transaction data confirm that it takes self haulers longer to manually unload their vehicles than it takes for the commercial trucks, which are automated. It is worth noting that collection vehicles average five tons per load while self haulers average half a ton per load.

The time on site was measured using transaction data that is recorded by the cashiering system at the transfer stations. Transaction times are recorded when a vehicle enters and leaves the station at the in- and outbound scales. The data were graphed by type of customer for weekdays and weekend days. The transaction time data were averaged over a one year period.

Application: The results (summarized below) indicate that only one station -- Bow Lake -- meets the 16 minute standard for commercial collection companies. For business self haulers, all stations meet the 30 minute standard on weekdays, however Bow Lake, Factoria and Houghton do not meet the standard on weekends. In addition, all stations meet the 30 minute standard for residential self haulers on weekdays and weekends, with the exception of Bow Lake, which does not meet the standard on weekends (See Appendix B).

Table 2: Summary of Results for Criteria #2 - Time on Site

Station	Meets commercial vehicle standard	Meets business self-hauler standard[1]	Meets residential self-hauler standard[2]
Algona	No	Yes	Yes
Bow Lake	Yes	No	No
Factoria	No	No	Yes
Houghton	No	No	Yes
Renton	No	Yes	Yes

[1] All stations meet standard weekdays, but those with "no" do not meet it on weekend days.

[2] All stations meet standard weekdays, but those with "no" do not meet it on weekend days.

3. Facility Hours Meet User Demand

Description: A primary component of providing quality service at the transfer stations is providing sufficient hours to meet customer demands. The Solid Waste Division has the flexibility to adjust operating hours to fit actual needs. Most of the changes in hours undertaken in the last year have been in response to requests from the commercial collection companies. The commercial collection companies bring most of the waste to facilities. The latest request to extend hours at the Factoria and Bow Lake transfer stations will take effect on May 9, 2005. All sites are closed on three holidays per year (Thanksgiving, Christmas, and New Year).

Table 3: Criteria #3 - Transfer Station Hours (Effective May 9, 2005)

TRANSFER STATION	MON – FRI	SAT & SUN
ALGONA	6:15 a.m. – 5:00 p.m.	8:30 a.m. – 5:30 p.m.
BOW LAKE (Tukwila/SeaTac)	Open 24 hours beginning Monday at 12:01 a.m.	8:30 a.m. – 5:30 p.m.
FACTORIA (Bellevue)	6:15 a.m. – 11:30 p.m.	8:30 a.m. – 5:30 p.m.
HOUGHTON (Kirkland)	8:00 a.m. – 5:00 p.m.	8:30 a.m. – 5:30 p.m.
RENTON	6:30 a.m. – 4:00 p.m.	8:30 a.m. – 5:30 p.m.

To determine the optimum hours that transfer stations should be open, the division looks at monthly usage data by hour of day and day of week, hourly staffing and operational costs, and requests for services from commercial and self haulers.

To measure whether station hours are meeting user demands, four factors were considered:

- The numbers of tons and transactions per hour for commercial and self haulers
- Observations from the Operations staff at the stations, particularly at the beginning and end of each day; for example, long lines at the end of the day could indicate the need to remain open longer
- Requests from the commercial collection companies for hours required to coincide with their hauling routes and times
- Customer comments regarding hours

These four factors give the division a clear indication of whether station hours are meeting customer demand.

Application: Based on the four factors, all stations will meet customer demand. If customer patterns change, hours can be adjusted.

4. Recycling Services Provided at the Transfer Stations Meet the Waste Reduction and Recycling Policies in the Comprehensive Solid Waste Management Plan

Description: The cities and the county have become leaders in the promotion of waste reduction and recycling by working cooperatively on a number of region-wide programs. Waste reduction and recycling have become one of the division's highest priorities, but one that is met primarily through partnering with cities, agencies and businesses, through promotion, collection and education programs. The vast majority of recycling is handled through the private sector and never reaches County transfer stations.

While primary recyclables are collected at most stations, space constraints do not allow for expanding the number and types of commodities accepted. For example, bins for collecting primary recyclables were removed from the Factoria Transfer Station in 2004 to expand the collection area for household hazardous waste (HHW). The HHW collection service began as a pilot project and became such a successful and popular service in the community that it was made permanent.

Table 4: Recyclable Materials Collected at Transfer Stations

Transfer Stations	**Recyclables Accepted for Free**							**Fee Recyclables and Other Materials**					
	Glass	Aluminum	Mixed Waste Paper	Newspaper	Tin Cans	Cardboard	Plastic Bottles #1 & #2	Yard Waste	Appliances **with** CFCs	Appliances **without** CFCs	Clean Wood	Household Hazardous Waste (HHW)	Reusable Items (textiles)
Algona													
Bow Lake	X	X	X	X	X	X	X		X	X			
Factoria												X	
Houghton	X	X	X	X	X	X	X						X
Renton	X	X	X	X	X	X	X						

The evaluation criterion for recycling is to compare the policies for transfer stations set forth in the adopted *Final 2001 Comprehensive Solid Waste Management Plan* with the services currently offered at each station. The policies in the solid waste plan are as follows:

- WRR-2 – The county should enhance existing waste reduction and recycling programs, add more recycling opportunities at county transfer stations.
- WRR-24 – The cities and county should provide for collection of primary recyclables including glass, tin and aluminum cans, mixed waste paper, newspaper, #1 and #2 plastic bottles, and yard waste (YW in chart below) and evaluate adding other materials as either primary or secondary recyclables by targeting specific commodities.
- WRR-37 – Where feasible, the county should provide areas for source-separated yard waste collection at all existing, new or upgraded transfer stations and drop boxes.

Application: When county policies WRR-2, WRR-24, and WRR-37 are applied to the stations, all five stations fail to meet the standard.

Table 5: Application of Criterion #4

STATION	WRR-2	WRR-24	WRR-37	Meeting WRR Goals
ALGONA	No service	No service	Not feasible*	**No**
BOW LAKE	Primary service. Limited secondary	Primary service. No YW	Not feasible*	**No**
FACTORIA	No service	No primary	Not feasible*	**No**
HOUGHTON	No enhanced service now	Primary service. No YW	Not feasible*	**No**
RENTON	No enhanced service now	Primary service. No YW	Not feasible*	**No**

*Due to space constraints in the current configuration of the transfer stations.

5. Vehicle Capacity a) Meets Current Needs, b) Meets 20-Year Forecast Needs

Description: Vehicle capacity is the measure of a station's ability to accommodate the flow of both commercial and self-haul vehicles. There is very little existing literature on how to quantify the capacity of a solid waste facility. The standard used here was developed using transportation industry standards of measurement for capacity of roadways and intersections – called a level of service or LOS measurement. An LOS measurement is a qualitative measure based on quantitative data. Consultants were retained to refine this methodology and to apply them to the transfer stations. The methodology for rating actual vehicle and tonnage capacity was developed by determining each station's maximum sustainable operating capacity. Optimal operating capacity is defined as the maximum optimal number of vehicles or tonnage that can be processed through the station each hour based on the station design and customer mix.

The standard chosen for vehicle capacity is an LOS score of C (on a scale of A to F), which is defined as a steady flow of vehicles except during occasional peak periods. The LOS measurements, which apply to this criterion and the next criterion for tonnage capacity, are defined as follows:

- LOS A - Can easily accommodate vehicle and tonnage throughput at all times of the day (optimal operating capacity exceeded <0.5% of operating hours)

- LOS B - Able to accommodate vehicle and tonnage throughput at most times of the day. (optimal operating capacity exceeded between 0.5% - 5% of operating hours)

- LOS C - Able to accommodate vehicle and tonnage throughput all times of the day, except for occasional peak hour times. (optimal operating capacity exceeded 5% - 10% of operating hours)

- LOS D - Beginning to have difficulty accommodating all vehicle and tonnage throughput during peak hours. (optimal operating capacity exceeded 10%-20% of operating hours)

- LOS E - Cannot accommodate vehicle OR tonnage (one or the other) throughput without off-site impacts or overloading on-site resources. (optimal operating capacity exceeded 20 - 50% of operating hours)

- LOS F - Cannot accommodate vehicle and tonnage throughput without off-site impacts and overloading of on-site resources. Throughput capacity exceeded most hours (optimal operating capacity exceeded >50% of operating hours).

In the case of transfer stations, the best case scenario is not LOS A. For example, a station built to accommodate tonnage and traffic for 20 years typically has an LOS A when it first opens, and is considered to be under capacity. However as population grows, the station will eventually grow to a LOS C which is considered ideal. Measurements of vehicle capacity within the King County system focus primarily on weekend days since that is when most transactions occur.

Application: Vehicle capacity (criterion #5) – for 2004 and 2025

Results of the LOS analysis for vehicle capacity appear in Tables 6 and 7, below, and are described in detail in Appendix C. The LOS rating was based on the percentage of total operating hours that the optimal operating capacity was exceeded. Weekends and weekdays are shown separately; the final "Combined LOS" includes weekdays and weekends. A LOS of C or better meets the criteria.

Table 6: 2004 Vehicle Capacity LOS

Facility	Weekday LOS	Weekend LOS	Combined LOS	Meets Criteria?
Algona	E	C	E	No
Bow Lake	B	D	C	Yes
Factoria	D	C	D	No
Houghton	E	D	E	No
Renton	B	A	B	Yes

Table 7: 2025 Estimated Vehicle Capacity LOS

Facility	Weekday LOS	Weekend LOS	Combined LOS	Meets Criteria?
Algona	F	F	F	No
Bow Lake	E	F	E	No
Factoria	E	F	E	No
Houghton	F	F	F	No
Renton	D	D	D	No

The results show that vehicle capacity standards are currently being met only at the Bow Lake and Renton transfer stations. By 2025, none of the five stations will meet this criterion.

6. Average Daily Handling Capacity (Tons) a) Meets Current Needs, b) Meets 20-Year Forecast Needs

Description: Tonnage capacity is the ability of a station to accommodate the flow of both commercial and self-haul garbage tons during the hours of operation. It is measured using the same rating system discussed for vehicle capacity (#5).

The County's goal for tonnage capacity at a division transfer station is LOS C or above.

Application: Tonnage capacity (criterion #6) – for 2004 and 2025

Results of the LOS analysis for tonnage appear in Tables 8 and 9, below, and are described in detail in Appendix D. The LOS rating was based on the percentage of total operating hours that the optimal operating capacity was exceeded. Weekends and weekdays are shown separately; the final "Combined LOS" includes weekdays and weekends. A LOS of C or better meets the criterion.

Table 8: 2004 Tonnage Capacity LOS

Facility	Weekday LOS	Weekend LOS	Combined LOS	Meets Criteria?
Algona	D	A	D	No
Bow Lake	D	A	D	No
Factoria	C	A	C	Yes
Houghton	E	B	E	No
Renton	B	A	A	Yes

Table 9: 2025 Estimated Tonnage Capacity LOS

Facility	Weekday LOS	Weekend LOS	Combined LOS	Meets Criteria?
Algona	E	A	E	No
Bow Lake	E	B	E	No
Factoria	E	A	E	No
Houghton	F	B	F	No
Renton	C	A	C	Yes

The results for tonnage capacity are generally similar to the results for vehicle capacity. Currently, only Factoria and Renton have sufficient capacity to meet existing tonnage requirements. Assuming a similar pattern of demand, in 2025 only Renton will have sufficient tonnage capacity.

The overall assessment of whether or not this criterion was met was based on the LOS for the combined days (weekend days and weekdays). However, the difference between weekday and weekend LOS results is worth noting. All five stations meet tonnage capacity goal on the weekends, while only Renton meets this goal on the weekdays. This is because self-hauler activity is much greater on weekends resulting in much higher vehicle traffic. So while much more tonnage is received from commercial collection companies on weekdays, the larger number of vehicle/self haul traffic occurs on the weekends.

7. Space for 3 Days' Storage of Average Daily Solid Waste Tonnage During an Emergency a) Meets Current Needs, b) Meets 20-Year Forecast Needs

Description: This criterion establishes whether a transfer station can continue to operate, or accept garbage, for at least three days in the event of a major regional disaster. Three days is the value used by FEMA (Federal Emergency Management Agency) to account for the average time needed to ensure that more immediate needs are being met such as victim search/rescue, clearing of transportation lifelines to hospitals, etc.

The Algona, Factoria, Houghton, and Renton transfer stations are two-trailer, direct load facilities, meaning, the tipping floor is flat with two chutes under which transfer trailers are parked. Garbage is unloaded directly from the vehicle into the transfer trailers. Therefore, capacity at these stations is defined as the number of empty trailers available at the site. Since there is no way to predict how many empty transfer trailers may be available at a site at any given time, the criterion was measured based on how much space is available for garbage storage on the facility tipping floor.

Bow Lake is the only urban transfer station evaluated with a storage pit. At Bow Lake, garbage is unloaded from the vehicle to the pit and then bulldozed into a transfer trailer chute at the far end of the pit. Storage space at this station is a combination of available empty trailers and space in the pit.

Application: All five of the transfer stations fail to meet the criterion for three days of garbage storage in the event of a major regional disaster, both currently and in the future. The four direct load facilities have little storage space within the transfer station building itself, i.e., on the tipping floor. Because of its push-pit design, the Bow Lake station has nearly one days' storage in the pit.

8. Space Exists for Station Expansion a) Inside the Property Line, b) On Available Adjacent Lands Through Acquisition

Description: Space for expansion at a station is a criterion that measures the ability of a station to expand to accommodate regional population and employment growth, the addition of services, and the area needed for a waste compactor. If there is unused space inside the property line, the active area of the station could be expanded. If the transfer station activity is already expanded to the property line, the division could look at the feasibility of acquiring adjacent property.

To evaluate the feasibility of expansion, the division reviewed the footprint of the active area of the site in relation to the property borders to determine if there are undeveloped areas of the site available for use. Aerial maps were used to show where the active area and property lines are located at each station. If expansion within the property line is not feasible, the division would need to look at adjoining property and its zoning and land use to determine possibilities for acquisition.

Application: The following pages contain maps for each of the five urban transfer stations, showing the room for expansion inside the property line and on available adjacent lands. Tables 10 and 11 below summarize the assessment of this criterion for each transfer station, based on a review of these maps. Note: this is a preliminary assessment based on mapping analysis only; it does not examine other criteria affecting the feasibility of expansion, such as zoning, site characteristics, permitting and costs.

Table 10: Available Expansion Inside the Property Line

Transfer Station	Yes/No	Comments
Algona	N	No available space for expansion within existing property lines.
Bow Lake	Y	Approximate potential expansion area 0.6 acres south of transfer building, 0.8 acres west of transfer building.
Factoria	Y	14 acres of land adjacent to existing transfer station property purchased by the Solid Waste Division for replacement of existing station.
Houghton	Y	1.2 acres of land northeast of station not currently used. Area is part of Houghton Custodial Landfill. Excavation of this landfilled material would be necessary if area is to be made usable.
Renton	Y	0.2 acre available for expansion within existing property lines.

Table 11: Potential Expansion On Adjacent Lands Through Acquisition

Transfer Station	Yes/No	Comments
Algona	Y	Potential to acquire 0.6 acres north of station. Currently have Street Use Permit from City of Algona for use. If not needed for private development, City may consider selling.
Bow Lake	Y	Potential to acquire part of 10 acre parcel from Washington State Department of Transportation to the north of station, 0.7 acre privately owned parcel south of station. 400+ acre high tech/business park/mixed use development planned around station. Potential for new access road into this development constructed between station and I-5.
Factoria	N	Adjacent properties are currently developed and house existing businesses.
Houghton	N	Adjacent property is in recreational or residential use.
Renton	Y	0.9 acres located northwest of station, currently owned by KCDOT, possible expansion area. However, this area is 100 feet away from existing transfer station property and would be separated by overhead high voltage power lines.


.61 Acres
Owner: City of Algona
Transfer System
Level of Service
Criteria - 8a, 8b
Station Expansion
Draft
Algona
Station
Some Potential Expansion Areas
Active Area Boundary
Station Property Line
Parcel
The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.
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Department of
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Solid Waste Division
January 12, 2005
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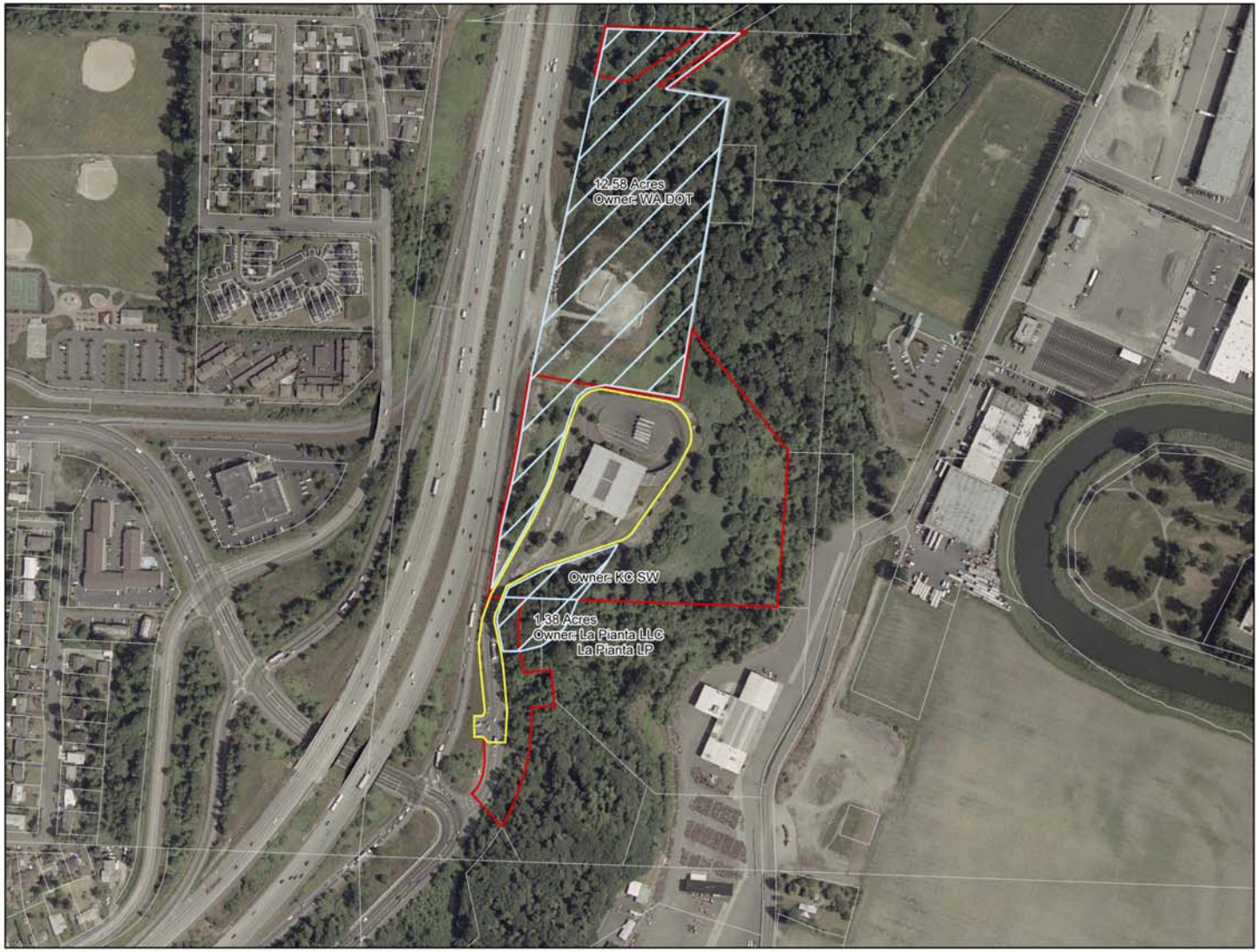

Transfer System Level of Service Criteria - 8a, 8b Station Expansion

Draft

Bow Lake Station

Some Potential Expansion Areas
Active Area Boundary
Station Property Line
Parcel

N

King County
Department of
Natural Resources and Parks
Solid Waste Division

January 12, 2005

300 150 0 300
Feet

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Transfer System Level of Service Criteria - 8a, 8b Station Expansion

Draft

Factoria Station

Some Potential Expansion Areas
Active Area Boundary
Station Property Line
Parcel

N

King County
Department of
Natural Resources and Parks
Solid Waste Division

January 12, 2005

250 125 0 250 Feet

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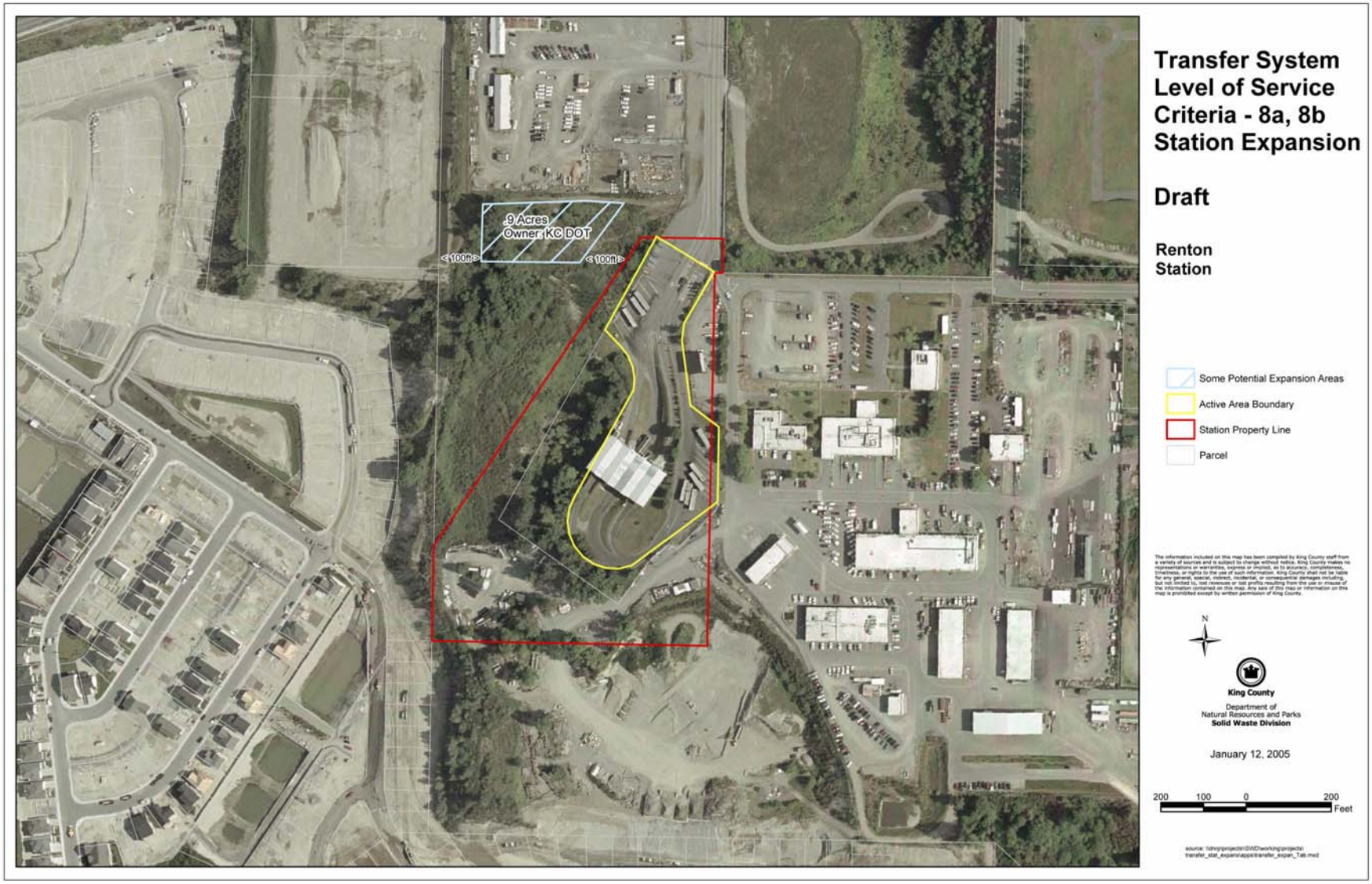
Transfer System
Level of Service
Criteria - 8a, 8b
Station Expansion
Draft
Houghton
Station
Some Potential Expansion Areas
Active Area Boundary
Station Property Line
Parcel
1.21 Acres
Owner: KC SW
.4 Acres
Owner: KC SW
N
King County
Department of
Natural Resources and Parks
Solid Waste Division
January 12, 2005
200 100 0 200
Feet


.9 Acres
Owner: KC DOT
< 100ft >
< 100ft >
Transfer System
Level of Service
Criteria - 8a, 8b
Station Expansion
Draft
Renton
Station
Some Potential Expansion Areas
Active Area Boundary
Station Property Line
Parcel
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Solid Waste Division
January 12, 2005
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9. Minimum Roof Clearance of 25 Feet

Description: The purpose of this measure is to evaluate roof clearance. According to the commercial collection companies, their collection vehicles require a roof clearance of 25 feet to unload efficiently.

Over the last 30 years, the collection vehicles have become larger to accommodate more garbage in fewer trips. Due to the added length, the collection vehicles with automated lifts that allow the garbage to slide out the back of the trailer rise higher than they did in the past. As a result, at the older transfer stations with roofs lower than 25 feet from the tipping floor, the collection vehicles are hitting and damaging the roofs, supporting structures, or hanging lights.

Application: New roofs, higher than 25 feet, were put on the Algona and Renton transfer stations in 2002 and 2003, respectively. A new roof with more than 25 feet of clearance was constructed at Bow Lake in 1977. Both the Factoria and Houghton stations have roof clearances of less than 25 feet. The roof at Houghton is expected to be raised in 2006.

Table 12: Roof Clearances at the Transfer Stations

Station	Year Roof Built	Clearance (lowest)	Clearance (highest)	Meets Criterion?
Algona	2002	27 ft. 8 in.	31 ft. 3 in.	Yes
Bow Lake	1977	32 ft.	40 ft.	Yes
Factoria	1964	20 ft. 2.4 in.	22 ft. 4.8 in.	No
Houghton	mid-1960s	21 ft.	22 ft. 6.6 in.	No
Renton	2003	27 ft. 8 in.	31 ft. 3 in.	Yes

Figure 3: Criteria 9 - Roof Height

A commercial garbage truck with trailer raised inches from the roof.

Roof damage caused by a collection vehicle.

10. Meets Goals for Customer and Employee Safety

Description: Customer and employee safety at the transfer stations is one of the division's number one priorities. All transfer stations hold current permits from the Department of Health and meet health and safety regulations.

All transfer stations met applicable building codes at the time of construction and have been grandfathered with respect to building code updates; however, all are old and inefficient. The division has comprehensive reporting and prevention mechanisms in place to minimize any potential safety hazards, as well as hazard response equipment and procedures.

The more congested the station and constricted the operations become, the higher the concern for safety. The presence of these physical challenges does not mean that the stations operate in an unsafe manner. It does mean that it takes extra effort by staff and management, which reduces system efficiency, to ensure the facilities are operated safely.

The division developed three measures of safety to monitor stations for potential areas of concern. First, the division assessed customer and employee accident/injury reports to determine whether there are operational procedures or areas that require investigation. Second, the division looked at customer vehicle damage reported at the stations. Customer vehicle damage could occur as a result of traffic congestion on the tipping floor; station design, such as the presence of supporting pillars and other impediments near the tipping area; and other factors. Third, the division evaluated incidents of facility damage that may be the result of facility layout or operation.

Application: The division identified 12 safety goals above and beyond required safety standards that each station should ideally meet. These safety goals were applied to the five urban transfer stations.

Table 13: Summary of Application of Criteria #10 – Safety

#	GOALS	Algona	Bow Lake	Factoria	Houghton	Renton
1	Segregation of commercial & self-haul unloading area	No	Yes	No	No	No
2	No crossing traffic pattern	No	No	No	No	No
3	Vehicle maneuvering on tipping floor without structural obstructions	No	Yes	No	No	No
4	Segregate traffic lanes - customers from operational traffic	No	No	No	No	No
5	Stationary compactor boom isolated from customer activity area	No	Yes	No	No	No
6	One-way traffic pattern	No	Yes	No	Yes	Yes
7	15 foot stall width and 65 foot tipping floor width	No	No	No	No	No
8	Clearance of at least one foot for trailer maneuvering	No	No	No	No	No
9	Employee walkway space of at least five feet on tipping floor	No	Yes	No	No	No
10	Back-up power available	Yes	Yes	No	Yes	Yes
11	Enclosed transfer station building	No	No	No	No	No
12	Sensitive area set-backs at least 50 feet	No	Yes	No	Yes	Yes
	Overall rating	No	No	No	No	No

Criteria 10-1: Segregation of Commercial & Self-haul Unloading Area.

A self-haul customer dumps right across the chute from a commercial hauler who dumps into the same chute.

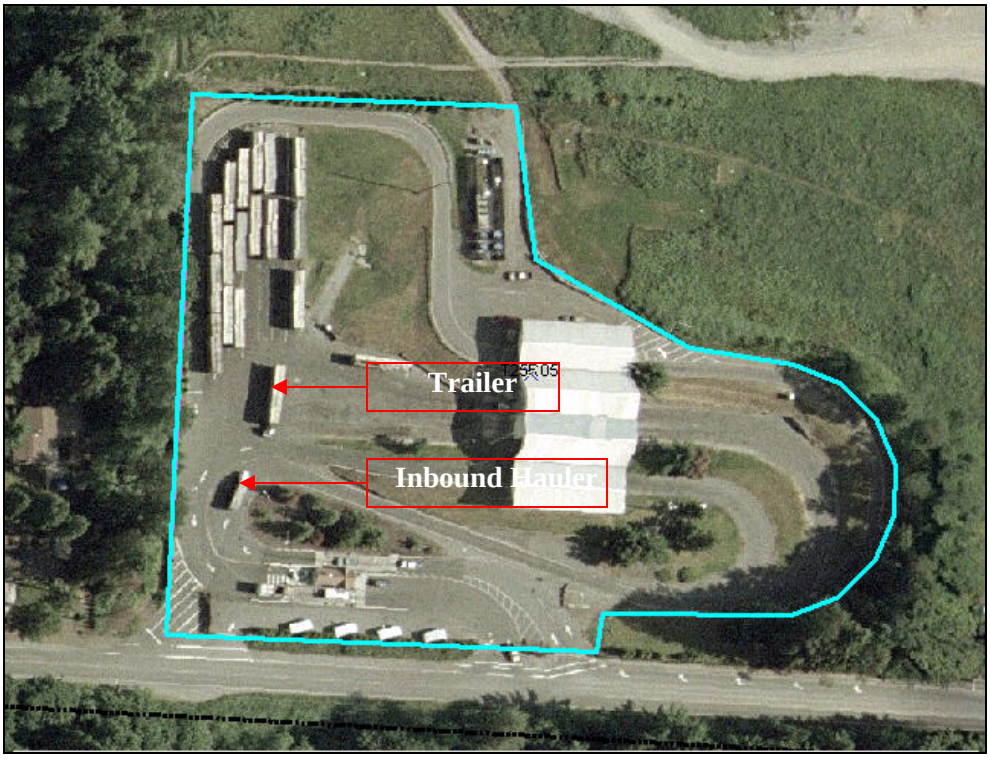
Garbage can overflow and fall onto the area across the dumping chute.

Criteria 10-1: Segregation of Commercial & Self-haul Unloading Area.

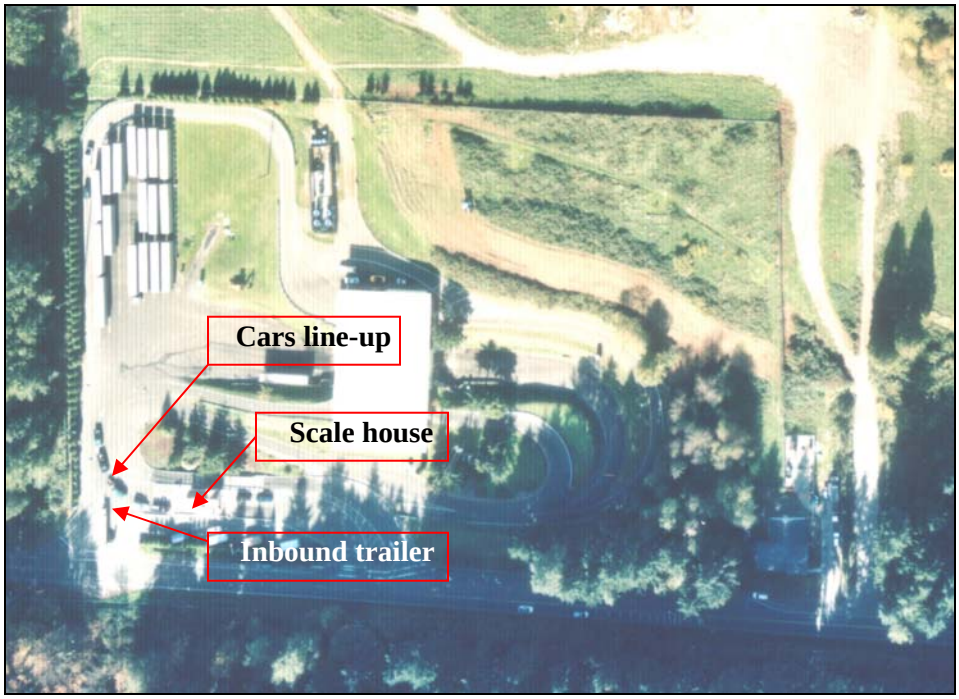
The back door of a commercial vehicle extends beyond the chute over the tipping floor on the other side of the chute.

The back door of a commercial vehicle opens over a self-haul vehicle while dumping garbage into the same chute.

Criteria 10-2: No Crossing Traffic Pattern.



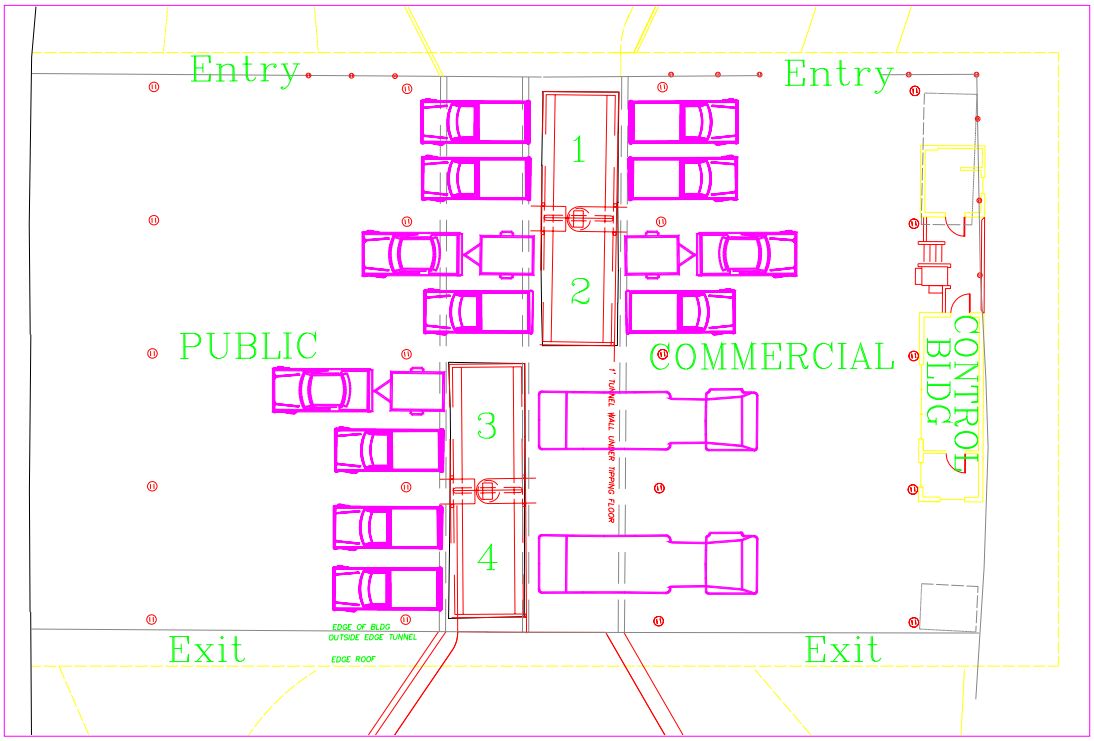
A trailer and hauler's vehicle are face to face.



An inbound empty trailer is blocked due to the backup of customers in line at the outbound scale.

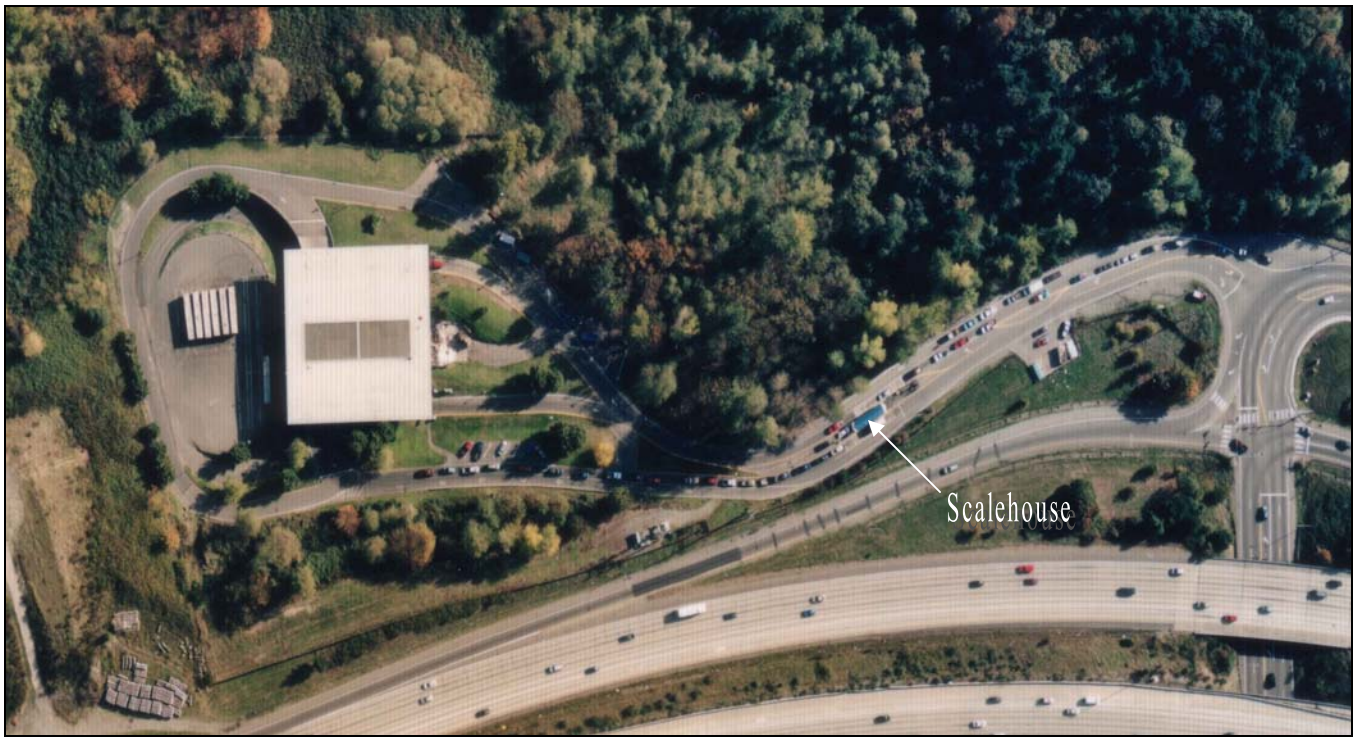
Criteria 10-3: Vehicle Maneuvering on Tipping Floor without Structural Obstructions.

Self-haul vehicles fill the dump slots in between the roof support pillars.
The black truck needed to maneuver in front of the blue truck to get in the stall.



Restricted stall width for maneuvering vehicles and inadequate tipping floor depth (space from chute to wall).

Criteria 10-4: Segregate Traffic Lanes – Customers from Operational Traffic.

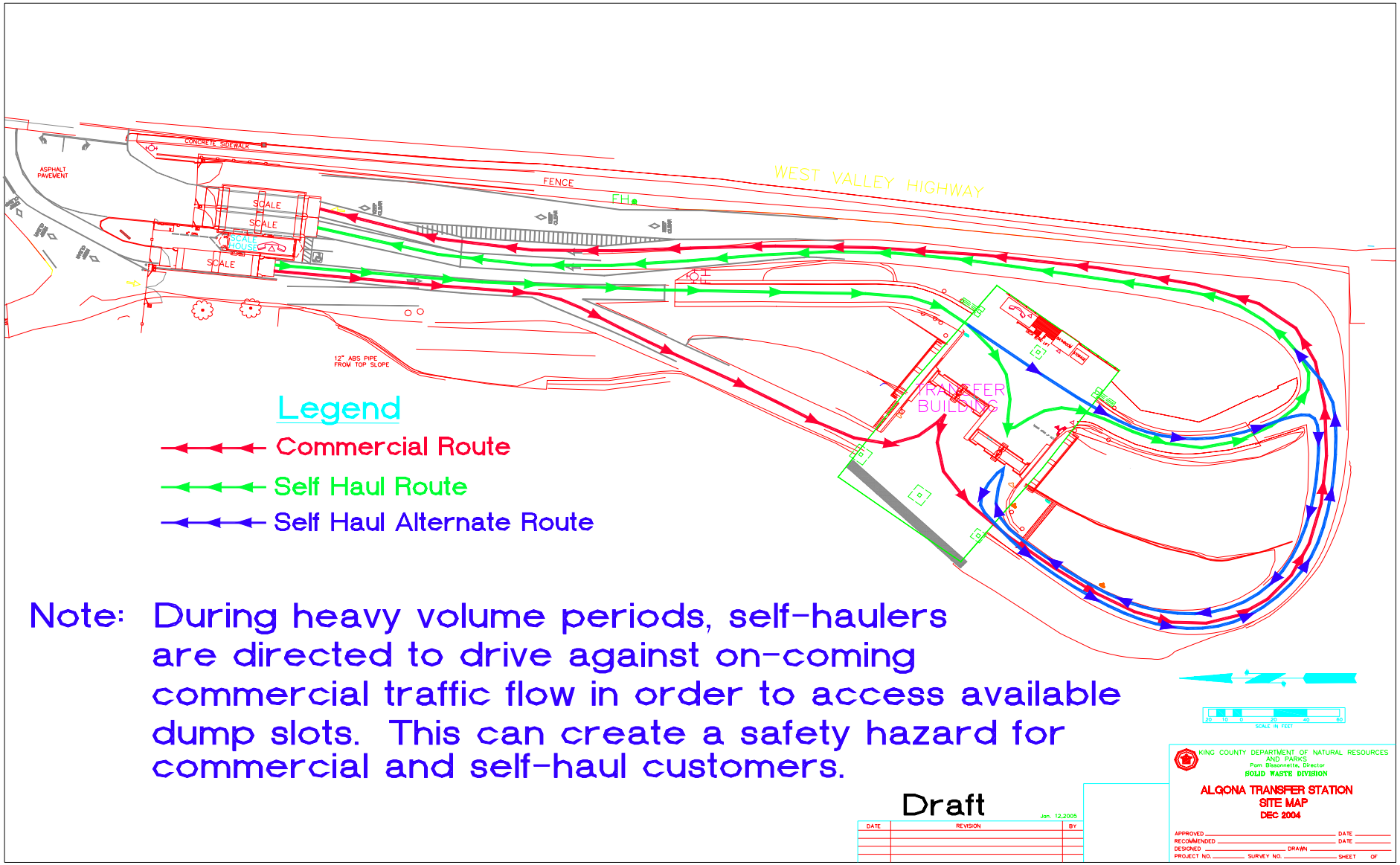


On busy weekend days, sometimes long lines of vehicles wait to get in and out of the station.

Criteria 10-5: Stationary Compactor Boom Isolated from Customer Activity Area.

The arm of the compactor boom is used to block the garbage that is being dumped into the chute.

Criteria 10-6: One-Way Traffic Pattern.



Criteria 10-7: 15 Foot Stall Width & 65 Foot Tipping Floor Width.

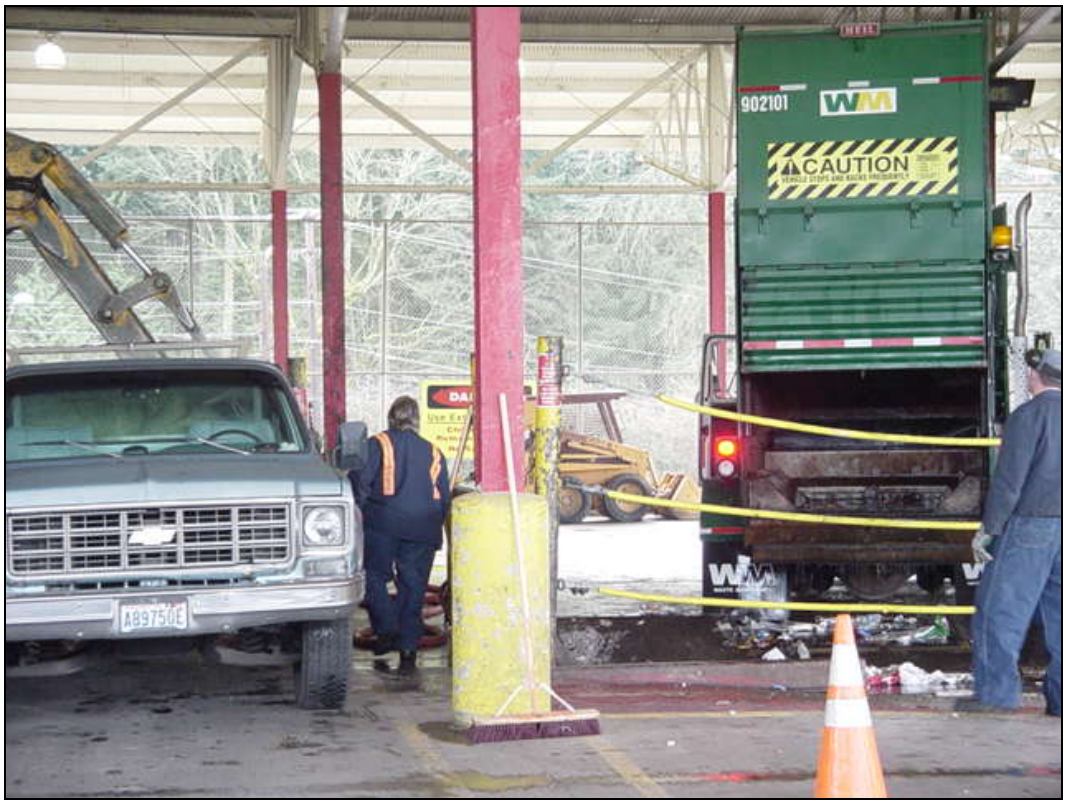
A commercial vehicle maneuvers past a roof support pillar after several attempts.

Criteria 10-8: Clearance of at least one foot for Trailer Maneuvering.

The trailers barely pass under top of tunnel. Chipped concrete at ceiling and scratches on the ceiling inside the right tunnel can be seen caused when trailers hit the tunnel ceiling.

The clearance of the trailer is just inches.

Criteria 10-9: Employee Walkway Space of at Least Five Feet on Tipping Floor.



An employee in the narrow walkway between the two chutes.
The two yellow lines on the floor show width.

Criteria 10-10: Back-up Power Available

Four of the five Transfer Stations have an emergency generator on site.

Criteria 10-11: Enclosed Transfer Station Building.

The old style partial end walls leave the facility open to the elements.

11. Ability to Compact Waste

Description: The ability to compact waste is an efficiency measure for transfer stations. Waste compaction at the transfer station enhances overall system efficiency and reduces costs by reducing the number of trips required to transport the same amount of waste to the Cedar Hills Regional Landfill. This also means fewer trips through host city neighborhoods and less impact on local roads.

Cedar Hills is the only remaining landfill in King County. It is expected to reach its permitted capacity and close within 10 years. At that time, the division will transition to waste export as a means of disposal. While the details of the waste export process are the topic of this and other concurrent studies, the division anticipates that waste will be exported to an out-of-county landfill.

Similar to the economies noted above, compacted waste creates fewer waste containers which can significantly reduce the operating and capital costs of transport and intermodal activity. The overall ability of transfer stations to accommodate waste export will need to be made as part of the overall discussion of waste export.

Application: None of the five urban transfer stations currently has compaction capability.

12. Meets the Goals for Level of Structural Integrity

Description: The purpose of this criterion is to ensure that the facility meets code requirements for seismic, wind and snow events. All facilities were constructed in compliance with the applicable building standards at the time and were grandfathered in their current condition. All were in compliance with applicable standards at the time of construction.

The Federal Emergency Management Agency (FEMA) has developed standards and a methodology for assessing existing buildings with regard to seismic performance. The King County Emergency Management Plan identifies transfer stations as mission critical facilities. The appropriate FEMA standard that would apply is the Immediate Occupancy standard. This standard means the facility could be expected to perform during a seismic event in such a way that it can be occupied immediately after the event.

To evaluate the structural integrity of the stations, the division hired consultants ABKJ and R.W. Beck to determine their compliance with Immediate Occupancy Requirements as established by FEMA. The stations were also evaluated under the 2003 International Building Code (IBC) which applies to the construction of new buildings.

Application: Of the five transfer stations evaluated, only the Algona and Renton transfer stations meet both the current IBC and FEMA standards. Bow Lake, Factoria, and Houghton do not meet either standard.

Table 14: Application of criterion #12 – Structural Integrity

Transfer Station	In Compliance with Applicable Building Standards	Meets FEMA Immediate Occupancy Standards and IBC
Algona	Yes	Yes
Bow Lake	Yes	No
Factoria	Yes	No
Houghton	Yes	No
Renton	Yes	Yes

13. Meets Applicable Local Noise Ordinance Levels

Description: The purpose of this criterion is to ensure that the facility does not violate applicable noise ordinances. There are both State and local (city) standards for acceptable noise levels impacting neighboring property based on zoning, land use, time of day and other factors. Noise levels are measured in decibels (dBA). For there to be a violation, noise regulations require that not only is the level exceeded, but that someone is bothered by it.[1] For example, a residential decibel limit would be applicable only if the limit was exceeded and a residence was adjacent to the station. There have been no citations for violations of noise ordinances at any of the five transfer stations.

The Division's consultant Clayton Group Services, measured noise levels at three points: (1) the perimeter of the transfer station, (2) 100 feet from the transfer building, and (3) at the site fenceline (which surrounds the active area of the site). Clayton also calculated the rate at which sound diminishes over distance to estimate the noise level caused by the transfer station activity at the property line in an effort to screen out background noise.

Application: Table 15 below illustrates the results of applying this criterion to the five transfer stations. Note the final determination of whether a station met this criterion (yes.no) was based on (1) whether or not the noise level met the most restrictive standard; and (2) whether someone could be impacted by the noise level. Specifically, Bow Lake transfer station was determined to meet this criterion despite the fact that the measured and calculated decibel level exceeded the commercial standard, since the surrounding land is either freeway or vacant. The potential exists for the criterion to not be met at the Houghton station, as the measured and calculated decibel levels both exceed the residential standard, and adjacent properties include residences. Although Factoria exceeds the noise level standard, there are no indications that the surrounding properties are impacted by noise from the transfer station, therefore no violation occurs.

[1] For example, Tukwila's relevant code defines public disturbance noises as "a sound that unreasonably disturbs or interferes with the peace, comfort and repose of owners or possessors of real property without regard to sound level measurement."

Table 15: Application of Criterion #13 – Noise

Transfer Station	Most restrictive adjacent land use	Measured value at property boundary	Calculated value at property boundary	Meets Criterion?
Algona	Residential limit of 65 dBA	~ 64 dBA	~61 dBA	Yes
Bow Lake	Commercial limit of 65 dBA	~ 63 dBA west – ~ 64 dBA NW corner -	~66 dBA	Yes
Factoria	Commercial limit of 65 dBA	~68 dBA west – ~64 dBA gate –	~59 – dBA	Yes
Houghton	Residential limit of 60 dBA	~67 dBA west – ~ 55 dBA east -	~61 dBA west– ~54 dBA east –	Yes
Renton	Commercial limit of 65 dBA	~ 57 dBA -	~51 dBA-	Yes

14. Meets Puget Sound Clean Air Agency Standards for Odors

Description: Measuring odors is a relatively subjective process. Complaints from the public or employees are the primary measure of whether odors are a problem at a transfer station. Odor complaints are typically reported either to the Puget Sound Clean Air Agency (PSCAA) or to the division.

According to PSCAA, the standard for a detrimental odor is considered to be:

> … any air contaminant in sufficient quantities and of such characteristics and duration as is, or is likely to be, injurious to human health, plant or animal life, or property, or which unreasonably interferes with enjoyment of life and property.

If an odor complaint is reported to PSCAA, an inspector is sent to the reported site to verify the complaint. The inspector ranks the odor from a Level 0 – no odor detected – to Level 4 – odor is so strong that a person does not want to remain present. If an odor is verified at Level 2 or above, PSCAA issues a citation to the generator of the odor.

In addition to reviewing division records for any PSCAA citations, complaint logs from the public were reviewed for any reports of odors received directly by the division.

Application: Four urban transfer stations (Algona, Bow Lake, Factoria and Renton) meet this criterion. No citations have been issued by PSCAA for any of the sites. There have been very few complaints about transfer station odors to the Solid Waste Division. One complaint was verified within the last two years at the Houghton Transfer Station but, again, no citation was issued.

15. Meets Criteria for Acceptable Traffic Impacts on Local Streets

- ***a) Additional traffic meets the local traffic level of service standard as defined in the* American Association of State Transportation Officials Manual**
- ***b) Traffic does not extend onto local streets during more than 5% of the operating hours***

Description: This criterion is intended to measure the impacts on local streets and neighborhoods from vehicle traffic and queuing near the transfer stations.[1] The measure of impacts extends from the station entrance to the surrounding streets that may be affected by self haulers' and commercial collection trucks that use the site. HDR Engineering, Inc. was hired by the Division to develop a methodology for these criteria. A detailed description of the methodology for applying these criteria is described in Appendix F.

Application: In 2004, Bow Lake transfer station was the only facility that did not meet current intersection LOS standards (Criteria 15a) due to congestion at the Orillia entry road intersection.

In 2004, only the Renton transfer station met Criteria 15b, where traffic queues entering the transfer station do not spillover onto or impede local streets during 95 percent of the operating hours. However, if only the latter half of the year were analyzed (which would represent new operating hours and functional changes made at all the transfer stations), Houghton meets Criteria 15b, as well. It is also important to note that in 2004, all of the sites met Criteria 15b on a weekday, while none of them met the criterion on a weekend.

16. 100-foot Buffer Exists Between Facility Active Area and Nearest Residence

Description: The goal of this criterion is to have a 100-foot buffer between the active area of the transfer station and the nearest residence. This distance has been used by the division as an internal standard for mitigating any adverse effects that might come from the transfer stations.

Application: Appendix F contains maps that show the outline of the 100-foot buffer at each of the five transfer stations. The maps indicate that Algona, Bow Lake, and Factoria meet this criterion,[2] and that Houghton and Renton do not meet this criterion.

[1] The 2001 Comprehensive Solid Waste Management Plan recognizes that the Solid Waste Division will discuss road impacts and their mitigation with the cities as necessary.

[2] A business (not a residence) is within 100 feet of the Factoria station.

Next Steps

This report is an interim step in the development of the waste export system plan. An addendum to this report will address Criterion 17 after MSWMAC has had the opportunity to discuss it further and make a recommendation.

The next step will be to begin work on the third report identified in Ordinance 14971: "Analysis of Options for Public and Private Ownership and Operation." This third report will include a discussion of the current roles of public and private parties in handling solid waste in the region, as well as a discussion and evaluation of various options for public and private ownership and operation of transfer and intermodal facilities.

Subsequent to the third report the division will work with stakeholders to develop transfer system alternatives that will meet system needs. This analysis will be contained in the fourth report: "Preliminary Transfer and Waste Export System Recommendations (with estimated system costs, rate impacts, and financial policy assumptions)."

Several additional steps must be taken to lay the analytical groundwork for the fourth report, including:

- Developing a priority ranking for the criteria;
- Conducting site-specific design and analysis work to:
  - Explore the need, technical feasibility, and cost of installing waste compaction at transfer stations; and
  - Review the opportunity for expansion and/or renovation of different stations.
- Clarifying the need for intermodal activities (including re-load capability); and
- Identifying a set of transfer *system* alternatives that can be analyzed for cost and rate impacts.[1] The fourth report will include an evaluation of Criteria 18 and 19.

The division will continue to work with the SWAC, ITSG, and MSWMAC in developing this report, as well as with representatives from commercial garbage companies and labor.

[1] It may be useful to think in terms of developing transfer *system* alternatives. Service levels at individual stations may differ but the transfer system will need to be considered as a whole.

List of Appendices (to be provided with final)

A. Ordinance 14971

B. Analysis for Criteria #2: Time on Site

C. Analysis for Criteria #3: Facility Hours meet User Demand

D. Capacity Evaluation for King County Transfer Stations (HDR Engineering, Inc.).

E. Methodology for Reviewing Traffic Impacts (Criterion #15); HDR Engineering, Inc.

F. Maps Showing Application of Criterion #16

<u>Supplemental Technical Reports</u> (Available by request from the Solid Waste Division)

1. Transfer Station Noise Surveys: A Comparison to Applicable Noise Ordinance Levels, Criteria 13
   Clayton Group Services, Inc; February 4, 2005

2. Preliminary Seismic Evaluation of Bow Lake Transfer Station
   MLA Engineering, plc. In conjunction with R.W. Beck, Inc.

3. Factoria and Houghton Transfer Stations Technical Report
   ABKJ Engineers; December 2004